Wireless Data Network Performance

November 5, 2010

RootMetrics routinely measures mobile data networks in major metropolitan markets and displays findings on RootMetrics.com. For the purposes of this report, data collection focused on 6 major metro markets — Chicago, Dallas, Los Angeles, New York, Oakland and Orange County— to provide a range of performance metrics across the 4 major carrier's data networks in areas across the country. RootMetrics analyzed network speed tests designed not to determine absolute maximum data throughput speeds, but rather the actual performance experienced by smartphone users downloading and uploading data.

Tests were conducted in August and September 2010 with results organized by market included in corresponding tables below. Note, data shown displays data collected during the test period only and reflects a snapshot in time.

Chicago

	Data Download Rate (kbps)	Data Upload Rate (kbps)
AT&T	422	368
Sprint	245	182
T-Mobile	430	300
Verizon	329	285

Dallas

	Data Download Rate (kbps)	Data Upload Rate (kbps)
AT&T	462	386
Sprint	236	175
T-Mobile	499	336
Verizon	342	278

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Los Angeles

	Data Download Rate (kbps)	Data Upload Rate (kbps)
AT&T	382	337
Sprint	287	225
T-Mobile	497	430
Verizon	343	307

New York

	Data Download Rate (kbps)	Data Upload Rate (kbps)
AT&T	418	297
Sprint	272	194
T-Mobile	451	393
Verizon	298	247

Oakland

	Data Download Rate (kbps)	Data Upload Rate (kbps)
AT&T	455	344
Sprint	309	233
T-Mobile	447	363
Verizon	372	295

Orange County, CA

	Data Download Rate (kbps)	Data Upload Rate (kbps)
AT&T	399	355
Sprint	316	229
T-Mobile	504	450
Verizon	366	304

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RootMetrics Methodology

RootMetrics offers an application that runs on standard consumer mobile devices and measures how users experience each carrier's network in a specific market. The application is downloaded onto a set of popular handheld devices simultaneously running the application as it conducts a group of performance tests. The application collects multiple unique data points that deliver millions of data permutations. The data is sent to our secure servers where it is combined, analyzed, and processed into reports of voice and data performance.

RootMetrics' goal is to provide measurement of how a consumer experiences a carrier's network. For this test, RootMetrics used four popular off-the-shelf carrier handsets that were not enhanced with external antennae or other non-standard equipment. We selected one handset per carrier running on the Android operating system, an open source platform adopted by wireless device manufacturers the world over. This platform provides the greatest depth of information possible across all carrier networks. For this test, we selected the Droid X (Verizon), HTC Evo 4 (Sprint; 3G network tested only), HTC Nexus One (AT&T), and HTC Nexus One (T-Mobile) .

Testing was conducted throughout the area roughly corresponding to the greater metropolitan area for each market. Millions of data points were collected through drive testing utilizing unadulterated consumer passenger vehicles. The drive tests aimed to cover as broad a geographic area as possible, focusing on freeways, major arterials, and areas of high street density. Routes for drive tests are planned in advance by RootMetrics managers in order to assure a significant depth of measurement within the area being studied. The test area covers not only commuter routes, but also the locations and areas where the most people live, work, shop and play.

The RootMetrics application performed the same 2 data tests during each test run to measure consumer network experience:

- **Average Download Speed**—the average number of seconds required to download a test file from the server
- **Average Upload Speed**—the average number of seconds required to upload a test file to the server

Each test, used a 64k data payload and ran automatically and continuously at six-minute intervals, requiring no action from the test operator. These tests are not meant to display maximum speeds, but rather, to show the average speed of consumer file uploads and downloads.

The results of the tests were analyzed and are summarized and reported as average download and upload speeds, resulting in a comparison of carrier performance empowering consumers to make an informed choice of carrier.

About RootMetrics

Bellevue, Washington-based RootMetrics is an independent, privately funded company that provides detailed reports on mobile network services based on data reflecting consumer experience under real-world conditions. Deploying a sophisticated smartphone application, RootMetrics gathers millions of data points reflecting metrics such as signal strength, data throughput speeds, and locations of dropped calls based on input not only from its own wireless testers but also from consumers helping to crowdsource performance information. Processed by a robust analytics engine, the data is brought to life through intuitive, easy-to-understand maps and other forms of reports that rate, down to the most granular levels, the actual experience of customers of a given wireless carrier. For more information, please visit www.rootmetrics.com.